Depression Anxiety Stress Scales (DASS): Revisited

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To evaluate psychometric properties of DASS, data obtained from 850 university students (Men = 306, women = 533, 11 cases did not report their sex) were analyzed. For men average age was 22.13 (*SD* = 2.27) and for women the mean age was 21.63 (*SD* = 1.79). Coefficient alphas for Depression, Anxiety, Stress subscales and full Scale (DASS-42) were .88, .85, .86, and .95 respectively and for DASS-21 these values were .79, .70, .76, and .89. For the total sample correlations among DASS-42 subscales were .75 to .81 and among DASS-21 subscales correlations were .61 to .67. For women correlations among DASS-42 subscales were .73 to .80 and among DASS-21 subscales correlations were .59 t0 .65 and for men these correlations were .77 to .83 and .63 to .70 respectively. Corrected item-total correlations and the correlations between each item and DASS subscales were within acceptable boundaries. This was true for both DASS-42 and DASS-21. All the correlations were significant ($p < .0001$). Principal component analysis with varimax rotation did not result in simple factor structure for any of the three subscales. Very few items loaded only on their corresponding factors. Most items loaded on two factors. Some items loaded on three factors also. The overall results indicate that for assessing depression, anxiety, and stress of Malaysian population DASS is a reliable and valid instrument. However, locally translated and adapted version of DASS is likely to serve better. Discussion includes implications of these findings.

Keywords: depression, anxiety, stress, university students

Depression Anxiety Stress Scales: Revisited

The Depression Anxiety Stress Scale (DASS) is a promising 42-item self-report measure of depression, anxiety, and stress (Lovibond & Lovibond, 1995). Theoretically, the DASS corresponds with the tripartite model of anxiety and depression (Clark & Watson, 1991). This model suggests that anxiety and depression have both shared and unique features. Depression is uniquely characterized by low positive affect and anhedonia, while anxiety has physiological hyperarousal as a unique feature. Depression and anxiety have a non-specific factor of general distress in common. This tripartite view has been supported in a variety of studies, including factor analytic studies by Watson, Clark, Weber, Assenheimer, Strauss, and McCormick (1995a, 1995b), and Endler, Macrodimitris, and Kocovski (2003), which revealed three separate variables (general distress, anhedonia vs. positive affect, and somatic anxiety).

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Based on their review of psychometric literature some researchers have concluded that earlier measures of anxiety and depression involve overlapping contents and correlate with one another quite highly (Clark, 1989; Moras, Di Nardo, & Barlow, 1992). Further, the trait version of the State-Trait Anxiety Inventory (STAI-T; Spielberger, 1983) is at least as sensitive to symptoms of depression as it is to symptoms of anxiety (Beiling, Antony, & Swinson, 1998). The Beck Anxiety Inventory (BAI; Beck & Steer, 1990) has been found to overlap less with measures of depression compared with other anxiety measures (Beck, Epstein, Brown, & Steer, 1988). However, the BAI items also tend to overlap almost exclusively with the panic attack symptoms and do not adequately capture other important features of anxiety, such as worry, agitation, and muscle tension (Antony, Swinson, Purdon, & Duwine, 1997 as cited in Antony, Beiling, Cox, Enns, & Swinson, 1998; Cox, Cohen, Direnfeld, & Swinson, 1996).

The Depression Anxiety Stress Scales (DASS; S. H. Lovibond & P. F. Lovibond, 1995) may hold more promise for distinction between anxiety and depression, as well as between symptoms of physical arousal and symptoms of generalized anxiety (e.g., tension or agitation). Factor analytic studies with nonclinical (P. F. Lovibond & S. H. Lovibond, 1995) and clinical samples (Antony, Beiling, Cox, Enns, & Swinson, 1998; Brown, Chorpita, Korotitsch, & Barlow, 1997; Clara, Cox, & Enns, 2001; Crawford & Henry, 2003; Nieuwenhuijsen, de Boer, Verbeek, Blonk, & van Dijik, 2003) have confirmed that the DASS items can be reliably grouped into three scales: (a) Depression (DASS-D), (b) Anxiety (DASS-A), and (c) Stress (DASS-S). The Depression Scale includes items that measure symptoms typically associated with dysphoric mood (e.g., sadness or worthlessness). Anxiety Scale, like the BAI, includes items that are primarily related to symptoms of physical arousal, panic attacks, and fear (e.g., trembling or faintness). Finally, Stress Scale includes items that measure symptoms such as tension, irritability, and a tendency to overreact to stressful events---symptoms that are not assessed by the BAI. The survey of available literature regarding psychometric properties of DASS indicates that all of these studies used English version of the scale with English speaking participants. This situation raises a question about the external validity of the findings of these studies. Thus, the present research focused on the question whether the previous findings pertaining to the reliability and validity as well as simple factor structure of DASS can be generalized to participants for whom English is a second and sometimes third language.

The purpose of the present research was to verify the results of the previous studies of the DASS using students of International Islamic University Malaysia as participants. The main objectives of the present study were as follows:

1. estimate the reliability of the DASS;

2. evaluate correlations among DASS subscales;

3. examine the convergent and discriminant validity of the DASS;

4. explore the factor loadings of the items of DASS subscales.

Method

Participant

Participants were 850 undergraduate and master students of International Islamic University Malaysia (Men = 306, Women = 533, 11 cases did not report their sex). Average age for men (n = 305) was 22.13 (SD = 2.27) with range = 18 - 32 years and for women (n = 531) mean age was 21.63 years (SD = 1.79) with range = 18 - 33 years (3 respondents did not report their age). Participation was entirely voluntary and the participants were not paid any monetary reward.

Measure

The DASS consists of three self-report scales designed to provide relatively pure measures of the three related negative affective states of depression, anxiety, and stress (P. F. Lovibond & S. H. Lovibond, 1995; S. H. Lovibond & P. F. Lovibond, 1995). Each of the three scales contains 14 items, divided into subscales of 2-5 items with similar content. The depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest or involvement, anhedonia, and inertia. The anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The stress scale assesses difficulty relaxing, nervous arousal, and being easily upset or agitated, irritable or over reactive, and impatient. The DASS Depression and anxiety scales showed good convergent validity with other scales designed to discriminate between depression and anxiety (P. F. Lovibond & S. H. Lovibond). Alpha coefficients for the three 14-item DASS scales were as follows: Depression = .91, Anxiety = .84 and Stress = .90 (n = 2,914; S. H. Lovibond & P. F. Lovibond). In the present study, DASS-42 and DASS-21 English versions were used.

Procedure

Postgraduate students taking 'Test Construction and Adaptation' course with the researcher collected data as part of their course requirement. All students were first given briefing about how to administer and score the test. In about ninety five percent of the cases the scale was self- administered. For the rest, it was individually administered.[1]

[1] I wish to express my gratefulness to the postgraduate students who allowed me to use the data which they collected as part of their course requirement.

Statistical Analysis

First, gender effects on DASS subscales were examined using independent sample t-test. The results of t-tests showed that women were significantly more anxious and stressed as compared to men on the average ($p < .05$). However, the two groups of participants did not differ significantly in terms of their mean depression scores ($p > .05$) (see Table 1). Therefore, the rest of the analyses were carried out on the whole sample using SPSS 12.0 software for window. To evaluate the internal consistency of the measures Cronbach's alphas were calculated for each of the DASS subscales and full DASS.

To examine the construct validity of the DASS-42, exploratory factor analysis was performed first. A principal component extraction was used, after which the number of factors was determined by both eigenvalues (>1) and the scree test (Cattell, 1966, as cited in Field, 2000). These criteria suggested a three-factor solution (eigenvalues = 13.365, 2.088, and 1.698), accounting 40.84 % of the variance. Previous research and theory suggest that the three scales, and the constructs they are designed to measure, are correlated (P. F. Lovibond & S. H. Lovibond, 1995). The obtained absolute correlations among factors were statistically significant ($p < .0001$) and similar to previous studies, with depression and anxiety factors correlating at .61 and .75, depression and stress correlating at .61 and .77, and anxiety and stress correlating at .67 and .81. These correlations suggested an oblimin rotation. However, in order to have easy to understand factor structure, a varimax rotation was employed to the initial solution.

To evaluate the factor structure of the DASS-21, exploratory factor analysis with principal component extraction was performed on the same students' sample (n = 850). Like the DASS-42 analysis, varimax rotation was used to examine the factor structure of DASS-21 also. Both the eigenvalues greater than one and scree plot suggested a three-factor solution (eigenvalues 6.599, 1.49,2 and 1.136), accounting for 43.94 % of the variance.

To further examine the construct validity, a correlational (Pearson's) analysis of convergent and discriminant validity was conducted by correlating each DASS item with its own DASS subscale (with item removed) and with other DASS subscales (Green & Salkind, 2005). It was hypothesized that DASS items would be highly correlated to their own DASS subscales and moderately correlated to other DASS subscales.

Results

Gender Differences on DASS

The independent sample t-test indicated absence of any significant gender difference in depression (see Table 1); mean DASS-D for men = 10.90 (*SD* = 7.48) and for women = 11.36 (*SD* = 7.04), t (837) = .89, p = .38. On the average, women scored significantly higher than men on anxiety and stress

subscales, t (837) = 3.22 and 3.17, $p < .002$.

Table 1
Mean Depression, Anxiety, and Stress Scores and Standard Deviations by Gender (DASS-42)

Scales	Men (n = 306)		Women (n = 533)			
	M	*SD*	*M*	*SD*	*t*	*p*
Depression	10.90	7.48	11.36	7.04	0.89	.375
Anxiety	12.45	6.99	14.03	6.80	3.22	.001
Stress	14.14	7.18	15.74	6.90	3.17	.002

Reliability

Internal consistency reliability coefficients for DASS-42 Depression, Anxiety, Stress subscales and full scale were found to be high, with Cronbach's alphas of .89, .85, .81, and .95 respectively. For DASS-21, these values were .79, .71, .76, and .89 (see Table 2).

Table 2
Internal Consistency and Convergent Validity of DASS- 42 & DASS- 21 (n = 850*)*

	DASS-42		*DASS-21*	
Scale	*Coefficient alpha*	*Item-total correlation*	*Coefficient alpha*	*Item-total correlation*
Depression	*.88*	*.45 - .60*	*.74*	*.44 - .57*
Anxiety	*.85*	*.35 - .61*	*.70*	*.34 - .48*
Stress	*.86*	*.42 - .61*	*.76*	*.41 - .57*
Full Scale	.95	.38 - .65	.89	.33 - .62

Note. All correlations are significant at the 0.0001 level (2-tailed).

Correlations among Subscales

Correlations among DASS subscales were high. In case of DASS-42, depression correlated with anxiety and stress at .75 and .77 respectively and anxiety correlated with stress at .80. In case of DASS-21, depression correlated with anxiety and stress at .61 and anxiety correlated with stress at .67. All correlations were significant ($p < 0.0001$ (2-tailed) (see Table 3). These correlations were high and significant for men and women samples separately also (shown in Appendix).

Table3
Correlations among DASS Subscales (n = 850)

	Depression	Anxiety	Stress
Depression	-	.61*	.61*
Anxiety	.75*	-	.67*
Stress	.77*	.81*	-

Note. Upper diagonal represents correlations among DASS-21 subscales.
Lower diagonal represents correlations among DASS-42 subscales.
**All correlations are significant at the 0.0001 level (2-tailed).*

Factor Analysis

DASS-42: The principal component analysis revealed that the first three unrotated factors together accounted for 40.84 % of the item variance, with eigenvalues of 13.37, 2.09, and 1.70. Table 4 shows the factor loadings for DASS-42 items. A factor loading of .40 or greater was considered significant ($p < .01$, two-tailed) (Stevens, 1992, as cited in Field, 2000). Eight depression items loaded on the corresponding depression factor only. One depression item loaded only on anxiety factor and two depression items loaded only on stress factor. The remaining three depression items loaded higher on anxiety than depression factor. The range of factor loadings (after varimax rotation) was .410 to .739. Among anxiety items, four loaded on anxiety factor, five on stress factor, and four on depression factor only. One of the anxiety item loaded both on depression and anxiety factors, but higher on anxiety factor. These factor loadings were .402 to .676. Seven items from stress scale loaded significantly on corresponding stress factor and five of these items loaded on anxiety only. The remaining two stress items loaded both on depression and anxiety, but higher on anxiety. These loadings ranged from .415 to .635.

DASS-21: The principal component analysis showed that the first three factors together accounted for 43.94 % of the variance, with eigenvalues of 6.60, 1.49, and 1.14. Table 5 presents the factor loadings for each item of DASS-21. As for DASS-42, items with loadings of .40 or greater were considered to load significantly on a particular factor. Overall, the factor structure of the Dass-21 was very similar to the DASS-42. Both the DASS-42 and DASS-21 failed to display simple factor structures.

The results presented in Tables 6 and 7 indicate that DASS-42 and DASS-21 have moderate convergent and discriminant validity. Most of the items correlated with their own DASS-42 subscale ($r = .48$ to .68, $p < .001$) higher than with other DASS-42 sub-scales ($r = .22$ to .60, $p < .001$). This was true for DASS-21 also; correlations with own DASS-21 subscales (.45 to .65, $p < .001$) were higher than correlations with other DASS-21 subscales (.29 to .56, $p < .001$).

Table 4
Structure Matrix of DASS-42 (n = 850)

Scale/Item Summary	Factor		
	Depression	Anxiety	Stress
DASS-Depression			
3 Couldn't experience positive	.557	-	-
5 Couldn't get going	-	-	.429
10 Nothing to look forward	.594	-	-
13 Sad and depressed	-	-	.431
16 Lost interest in everything	.549	-	-
17 Not worth much as person	.582	-	-
21 Life not worthwhile	.706	-	-
24 Couldn't get enjoyment	.496	-	-
26 Downhearted and blue	.418	.450	-
31 Unable to become enthusiastic	.410	.460	-
34 Felt worthless	.531	-	-
37 Nothing future hopeful	.604	-	-
38 Life meaningless	.670	.739	-
42 Difficult to work up initiative	-	.588	-
DASS-Anxiety			
2 Dryness of mouth	-	-	.534
4 Breathing difficulty	.400	-	-
7 Shakiness	-	-	.419
9 Situations made anxious	-	-	.514
15 Feeling faint	.545	-	-
19 Perspired noticeably	-	-	.403
20 Scared for no good reason	.481	-	-
23 Difficulty swallowing	.541	-	-
25 Aware of action of heart	-	-	.400
28 Felt close to panic	-	.539	
30 Feared would be 'thrown'	-	.595	-
36 Terrified	.411	.543	-
40 Worried about situations/panic	-	.676	-
41 Trembling	-	.505	-
DASS-Stress			
1 Upset by trivial things	-	-	.445
6 Overreact to situations	-	-	.592
8 Difficult to relax	-	-	.586
11 Upset easily	-	-	.490
12 Using nervous energy	-	-	.535
14 Impatient when delayed	-	-	.581
18 Touchy	-	-	.436
22 Hard to wind down	.415	.446	-
27 Irritable	-	.582	-
29 Hard to calm down	-	.569	-
32 Difficulty tolerating interruptions	-	.585	-
33 State of nervous tension	-	.504	-
35 Intolerant kept from getting on	-	.635	-
39 Agitated	.416	.556	-

Note. Factor loading ≥ .40 is significant at 0.0001level (2- tailed).

Table 5
Structure Matrix of DASS-21 (n = 850)

Scale/Item Summary	Factor		
	Depression	Anxiety	Stress
DASS-Depression			
3 Couldn't experience positive	.575	-	-
5 Couldn't get going	-	-	.417
10 Nothing to look forward	.683	-	-
13 Sad and depressed	.460	.550	-
16 Lost interest in everything	.610	-	-
17 Not worth much as person	.649	-	-
21 Life not worthwhile	.703	-	-
DASS-Anxiety			
2 Dryness of mouth	-	-	.542
4 Breathing difficulty	-	-	.700
7 Shakiness	-	-	.553
9 Situations made anxious	-	.642	-
15 Feeling faint	.491	-	.453
19 Perspired noticeably	-	-	.486
20 Scared for no good reason	.528	-	-
DASS-Stress			
1 Upset by trivial things	-	.454	-
6 Overreact to situations	-	.500	.428
8 Difficult to relax	-	.430	-
11 Upset easily	.427	.571	-
12 Using nervous energy	.435	.518	-
14 Impatient when delayed	-	.624	-
18 Touchy	-	.561	-

Note. Factor loading ≥ .40 is significant at 0.0001level (2- tailed).

Discussion

With regard to the internal consistency measures of the long and short versions of DASS, the current results are in line with the previous research findings. The internal consistency measures of both the versions of DASS were similar to past findings (S. H. Lovibond & P. F. Lovibond, 1995). Subscales of both the versions correlated with each other significantly. However, the short version had lower reliability coefficients than the long version of DASS. This is obvious given the fact that longer tests are more reliable than the shorter ones.

As regards factor structure of the DASS, the present findings did not support the previous results (e.g., S. H. Lovibond & P. F. Lovibond, 1995; Clara, Cox, & Enns, 2001; Crawford & Henry, 2003). None of the DASS versions yielded simple factor structure. Although three-factor solution seems likely, simple factor structure did not emerge for any of the two DASS versions. Quite a good number of items loaded on their corresponding factors, but some items loaded on other factors and a few items exhibited double factor loadings also. One possible reason may be the language of the test.

Table 6
Item Scale Correlations for DASS-42 (n = 850)

Scale/Item Summary	Factor		
	Depression	Anxiety	Stress
DASS-Depression			
3 Couldn't experience positive	**.61**	.44	.43
5 Couldn't get going	**.53**	.45	.47
10 Nothing to look forward	**.65**	.46	.48
13 Sad and depressed	**.59**	.50	.57
16 Lost interest in everything	**.64**	.43	.48
17 Not worth much as person	**.64**	.42	.42
21 Life not worthwhile	**.66**	.47	.44
24 Couldn't get enjoyment	**.65**	.49	.49
26 Downhearted and blue	**.63**	.50	.54
31 Unable to become enthusiastic	**.64**	.53	.54
34 Felt worthless	**.67**	.52	.51
37 Nothing future hopeful	**.68**	.48	.49
38 Life meaningless	**.66**	.44	.40
42 Difficult to work up initiative	**.60**	.50	.57
DASS-Anxiety			
2 Dryness of mouth	.22	**.48**	.32
4 Breathing difficulty	.40	**.54**	.39
7 Shakiness	.41	**.59**	.49
9 Situations made anxious	.34	**.54**	.49
15 Feeling faint	.51	**.54**	.44
19 Perspired noticeably	.38	**.58**	.39
20 Scared for no good reason	.51	**.59**	.48
23 Difficulty swallowing	.52	**.58**	.46
25 Aware of action of heart	.36	**.58**	.43
28 Felt close to panic	.50	**.63**	.57
30 Feared would be 'thrown'	.51	**.60**	.55
36 Terrified	.60	**.68**	.60
40 Worried about situations/panic	.44	**.59**	.52
41 Trembling	.49	**.64**	.52
DASS-Stress			
1 Upset by trivial things	.40	.38	**.51**
6 Overreact to situations	.32	.43	**.54**
8 Difficult to relax	.46	.46	**.59**
11 Upset easily	.54	.51	**.66**
12 Using nervous energy	.53	.55	**.58**
14 Impatient when delayed	.28	.37	**.53**
18 Touchy	.39	.42	**.54**
22 Hard to wind down	.56	.56	**.64**
27 Irritable	.55	.54	**.63**
29 Hard to calm down	.44	.51	**.64**
32 Difficulty tolerating interruptions	.40	.47	**.61**
33 State of nervous tension	.57	.60	**.68**
35 Intolerant kept from getting on	.48	.52	**.66**
39 Agitated	.57	.52	**.55**

Note. Bold Type indicates corrected item total correlations.
All correlations are significant at .0001level (2-tailed).

Table 7
Item Scale Correlations for DASS-21 (*n* = 850)

Scale/Item Summary	Factor		
	Depression	Anxiety	Stress
DASS-Depression			
3 Couldn't experience positive	**.61**	.49	.37
5 Couldn't get going	**.52**	.44	.44
10 Nothing to look forward	**.63**	.444	.45
13 Sad and depressed	**.57**	.39	.52
16 Lost interest in everything	**.65**	.42	.46
17 Not worth much as person	**.61**	.36	.36
21 Life not worthwhile	**.57**	.44	.36
DASS-Anxiety			
2 Dryness of mouth	.29	**.52**	.34
4 Breathing difficulty	.34	**.56**	.32
7 Shakiness	.45	**.55**	.49
9 Situations made anxious	.31	**.45**	.46
15 Feeling faint	.53	**.56**	.49
19 Perspired noticeably	.38	**.59**	.33
20 Scared for no good reason	.47	**.45**	.38
DASS-Stress			
1 Upset by trivial things	.39	.41	**.51**
6 Overreact to situations	.34	.49	**.60**
8 Difficult to relax	.42	.42	**.57**
11 Upset easily	.52	.45	**.65**
12 Using nervous energy	.56	.54	**.61**
14 Impatient when delayed	.32	.37	**.58**
18 Touchy	.37	.34	**.56**

Note. Bold Type indicates corrected item total correlations.
All correlations are significant at .0001level (2-tailed).

The participants might be unable to get the intended meaning of a particular statement. For example, "I found it hard to wind down," and "I felt that I was using a lot of nervous energy" are not the usual expressions used by non-English speaking students. Secondly, relatively low factor loadings may be explained in terms of sample homogeneity. The participants of this study were university students who represent a homogeneous population. A more heterogeneous sample from diverse population may result in higher factor loadings.

The present results about the convergent and discriminant validity of the DASS versions do support the previous findings. However, the validity coefficients are lower than those reported in the previous studies. The method used in the current study may partly explain this. In the present study traditional methods of establishing convergent and discriminant validity were not used. Furthermore, the shorter version yielded lower convergent and discriminant validity coefficients than the longer version.

Implications

Given the sensitivity, importance, and long term impact of diagnostic assessment in general and in clinical and counseling settings in particular, psychometrically sound measures of affective constructs such as depression, anxiety, and stress can make significant contribution towards supportive and remedial services in the field of applied psychology. Thus, it is essential that all reliable and valid measures of these constructs are evaluated before they are used in cultures other than the cultures of their origin.

Limitations and Directions for Future Research

This research has provided evidence that the DASS-42 and DASS-21 are internally consistent and valid measures of depression, anxiety, and stress. However, in the light of the present findings, it is desirable that future studies on psychometric properties of DASS should involve a larger random sample and use locally translated and adapted version of the scale. The present study used a homogeneous sample of students from one university only, which might have contributed to low correlation coefficients obtained in this research. In order to overcome the effect of sample homogeneity on correlation measures, it is recommended that future studies may involve more diverse heterogeneous sample including samples of people suffering from depression, anxiety, and stress.

Conclusion

Overall, the DASS appeared to be psychometrically adequate and useful instrument for the measurement of depression, anxiety, and stress of university students. However, for using this instrument more effectively in local setting it is essential that the scale is translated in local language and adapted locally and used along with local norms. Furthermore, it is advisable to use longer version of the scale than the shorter one.

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Appendix

Table A
Correlations among DASS-42 Subscales for Females (n = 533)

	Depression	Anxiety	Stress
Depression	-	.59*	.60*
Anxiety	.73*	-	.65*
Stress	.78*	.80*	-

Note. Upper diagonal represents correlations among DASS – 21 subscales.
Lower diagonal represents correlations among DASS-42 subscales
**All correlations are significant at the 0.0001 level (2-tailed).*

Table B
Correlations among DASS-42 Subscales for Males (n = 306)

	Depression	Anxiety	Stress
Depression	-	.63*	.63*
Anxiety	.77*	-	.70
Stress	.77	.83	-

Note. Upper diagonal represents correlations among DASS – 21 subscales.
Lower diagonal represents correlations among DASS-42 subscales
**All correlations are significant at the 0.0001 level (2-tailed)*